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THE STONE CELLS OF ACONITE ROOT.

By J. L. Stingel.

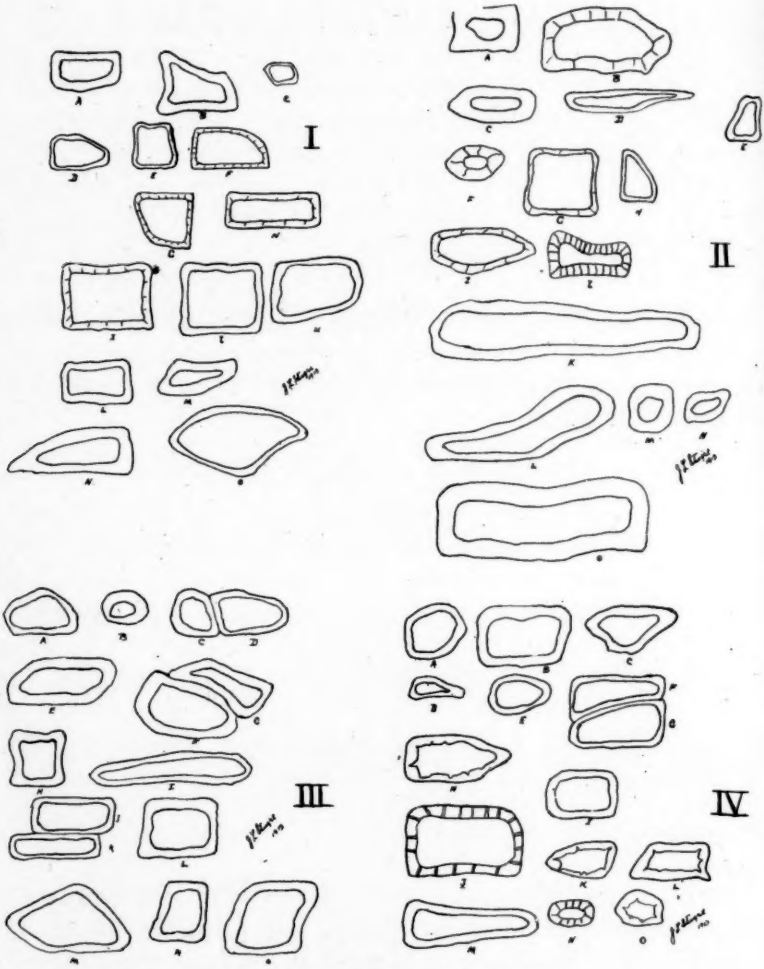
The writer no doubt owes an apology to the reader for adding to the already abundant literature on the microscopy of *Aconitum Napellus;* though the subject may appear practically exhausted, much can be learned by the restudy of a drug as it invariably reveals many interesting and frequently valuable information from the pharmacognostical view point.

Workers with a limited amount of experience are very apt to become confused if the elements do not compare favorably with those of an authentic sample or illustrations found in various text books, etc.; illustrations are helpful in a general way, but entire dependence should not be placed on them; the main trouble seems to be that many investigators are inclined to think the first few elements found are characteristic (?), whereas if a number of mounts of the same or different samples be examined it at once becomes evident that the term is very misleading; it is only after an extensive and personal acquaintance with many samples and their differences in elemental form that one becomes able to diagnose a drug with any degree of certainty.

What is said of stone cells also applies to other elements and from their condition, scarcity or abundance may often be learned whether or not the drug was gathered at the right season, and to a great extent judge its quality, etc.

Four authentic samples of powdered drug were used, the elements usually found in Aconite were present, disregarding these, all elements of a sclerotic nature were sought for, examined, measured and drawn.

Except in a few cases the different drawings represent the cells in the order of observance; they vary greatly in outline, no single form predominating; the roundish, square (?) and elongated are



Various forms of stone cells in Aconite root.

quite prominent and taken together outnumber all others. Fig. I, (f) and (g) and Fig. II, (h) shows a type occasionally met with, but which may be considered more of a curiosity than of diagnostic

value; cells vary in length from 51 to 391 mikrons and from 34 to 102 mikrons in breadth, eliminating the exceedingly large ones which are only occasionally met with, the most constant dimentions would average 119 mikrons in length and 70 mikrons in breadth.

The cell wall with an aqueous-glycerin solution of chloral hydrate, freshly mounted, in many cases showed a striate or homogenous structure, while in old mounts the wall was traversed by a few or many canals; in some the fissures were very prominent, appearing as if the cell wall was composed of beads or distinct segments. Fig. III, figure (j). Thickness of wall from 8 to 25 mikrons the average being from 8 to 12 mikrons.

The outline of the lumen in most of the samples was smooth or slightly irregular, one sample showed a marked deviation from the others, being deeply ragged and angular. Fig. IV, figures (h), (k), (l) and (o).

The number of stone cells, prominence of fissures and the outline of the lumen seems to vary considerably in different samples.

From the above illustrations may be seen that the elements vary greatly in form, in fact so much so that it is practically impossible to say which are characteristic.

While the writer chose the stone cells of Aconite as a type to show the great diversity in shape and structure, he did so only as a means to introduce the subject of a more careful restudy of plant elements from the diagnostic point of view; that the beginner should not gather his information from one sample, but by the careful examination of many; let us not in text books and articles sacrifice accuracy for briefness; much rather would I see an article profusely illustrated, allowing the worker to see the variations, than one or two characteristic (?) ones.

It is only after one is thrown on his own resources and where accuracy is required that one can appreciate the situation.

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WHAT IS THE PROPER TIME FOR THE COLLECTION OF SANGUINARIA?[1]

By V. O. Homerberg, P.D., and G. M. Beringer, Jr., P.D.[2]

The U.S.P. directs that Sanguinaria be collected after the death of the foliage. In order to determine if this were the proper time, a number of samples of the rhizome were collected at various times from May—just after flowering—to August—just before the leaves began to die.

The assays of these, as given in the appended table, show that, for maximum alkaloidal content, the time directed in the U.S.P. is the worst that could possibly be selected. It will be noted that the alkaloidal content decreases from 6.5 per cent., on May 12th, to 3 per cent., on July 6th, after which it remains practically stationary. The figures for loss in weight on air drying the fresh drug show a steady decrease in moisture content as the season advances.

This would seem to indicate that the alkaloidal principles are not products essential to the nourishment of the plant, but rather in the nature of waste products of plant metabolism. Hence, these principles are not increased in amount and stored up, like the resins, gums and starches, for a period of rest. The alkaloidal percentage is, in fact, reduced by the increase of the latter classes of substances and the consequent decrease in the amount of water during the less active period of plant life.

If this is the case the rhizome and root drugs which owe their activity to alkaloidal constituents should be collected at the time of greatest plant activity—*i.e.*, about or immediately after flowering. That such is the case with Sanguinaria, the figures here given indicate. No doubt similar facts will be found to obtain in the case of the drugs of a like character. The subject is presented as one worthy of further investigation. We believe that the U.S.P. statement regarding the time of collecting Sanguinaria should be modi-

[1] Read at the Annual Meeting of the New Jersey Pharmaceutical Association, June, 1913.

[2] The work embodied in this paper was carried out by Victor O. Homerberg and presented by him in a thesis, for his degree, before the Philadelphia College of Pharmacy. His associate has merely rewritten this portion for presentation to this Association.—G. M. B., Jr.

fied, because it is not the time at which the commercial drug is collected, nor is it the time of greatest alkaloidal content.

ASSAY OF COMMERCIAL DRUG.

Sanguinaria No. 1.....3.17 per cent. total mixed alkaloids.
Sanguinaria No. 2.....4.05 per cent. total mixed alkaloids.
Sanguinaria No. 3.....3.12 per cent. total mixed alkaloids.

ASSAY OF COLLECTED SAMPLES OF SANGUINARIA.

Time of collection.	Per cent. total alkaloids after air-drying.	Per cent. loss on air-drying (moisture).
5/12/12	6.50	82.51
5/23/12	5.55	80.75
6/7/12	4.60	78.75
6/21/12	3.40	74.56
7/6/12	3.00	75.05
7/19/12	3.95	73.26
8/2/12	3.90	72.31
8/29/12	3.95	70.28

AN ASSAY FOR SANGUINARIA.[1]

BY VICTOR O. HOMERBERG, P.D., AND GEORGE M. BERINGER, JR., P.D.[2]

Often, the mind of human science travels in a mental maze, taking its turns by guess or luck, blindly ignoring the pointing finger on nature's sign-post. To most, if not all, of her riddles nature herself furnishes the key. The assay of Sanguinaria Canadensis, and the problems involved in the search for that assay, furnish striking proofs of these two propositions. Few alkaloidal assays present so many difficulties.

The strong colors of the salts of the principal alkaloids preclude the use of any volumetric process, as no indicator and no end reaction would be available in their presence. In the separation of the alkaloids from the drug, the soluble alkalies—Soda, Potash and Ammonia—precipitate the coloring matter along with the alkaloids, which coloring matter later forms troublesome emulsions with the

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solvents. Kieselguhr and Kaolin were tried for removing the coloring matter, but were found to retain considerable of the alkaloids. Finally, Lime was found to liberate the alkaloids, and, at the same time retain the coloring matter.

Many of the volatile solvents, upon evaporation, leave the dissolved Sanguinaria alkaloids decidedly colored. This is true especially of Acetic Ether and Chloroform, traces of these solvents being apparently decomposed, thus giving enough free acids to salify a portion of the alkaloids. Chloroform is evidently the best solvent for the mixed alkaloids, but cannot be used upon this account. The next best solvent seems to be Benzol, but it takes up large quantities of coloring matter. The only two solvents free from this objection are Benzin and Ether. Benzin, however, as shown by LaWall (AMER. JOUR. PHARM., 1896, p. 305 et seq.) dissolves only a part of the alkaloids. Ether dissolves them all, but is required to be used in larger amount than Benzol because of its weaker solvent action. The final solution of this problem was the use of Ether for the first extraction, thus leaving behind practically all of the coloring matter, and the use of Benzol for the final extraction, thus giving a smaller bulk for evaporation.

The greatest trouble is met, however, in trying to extract the alkaloids from the ethereal solutions by means of acid solutions. The mineral acids, even in dilute solutions, precipitate a large part of the alkaloids. It has been this, no doubt, which has rendered most previously published assays uncertain and unreliable. Almost in despair appeal was had to nature. *She furnished the key that solved her riddle.* The alkaloids evidently existed in solution in the plant. With what natural acids were they combined? Almost thirty years ago, L. C. Hopp (AMER. JOUR. PHARM., 1875, p. 193 et seq.) demonstrated by simple but conclusive tests that those acids were Citric and Malic Acids. *Citric Acid* was the key. But, the question arose, would not the volatile solvents extract some of the Sodium Citrate formed upon neutralization of the acid solutions with Sodium Hydroxide? In order to determine this, Sodium Citrate was treated in separate portions with Ether and Benzol. Upon evaporation of the filtered solvent in a platinum basin no weighable residue was left in the case of Benzol, and only a slight residue in the case of Ether. Hence, using the two solvents in the order finally adopted in the perfected assay, the results were not vitiated by the presence of Citrates.

Many experiments and scores of unsuccessful assays were necessary to determine the facts given above. From them the following assay was evolved:

Gradually add seven cubic centimetres of water to two grams of air-slaked lime contained in a suitable dish. To the magma thus formed, add two grams of finely powdered Sanguinaria and incorporate thoroughly. Evaporate on a water bath to dryness. Transfer the dry material, after powdering, to a small percolator, the orifice of which has been closed with a pledget of paper pulp, moistened with a mixture of equal volumes of ether and benzol. Rinse the dish with a few cubic centimetres of the same ether-benzol mixture and pour the rinsings upon the material contained in the percolator. Continue the percolation by the addition of small portions of the ether-benzol mixture from time to time until a drop of the percolate, evaporated in a watch crystal and redissolved by the addition of one drop of diluted Hydrochloric Acid, no longer gives a precipitate with Mayer's Reagent. Transfer the percolate to a separatory funnel and wash with separate portions of solution of Citric Acid (5 per cent. of 25 c.c., 15 c.c. and 10 c.c. respectively. Continue the treatment with portions of 5 c.c. of the acid solution till one drop of the acid solution shows no precipitate with Mayer's Reagent.[3] Transfer the mixed acid solutions to a separatory funnel, add 15 c.c. of Benzol and afterwards sufficient Sodium Hydroxide Solution to make the mixture alkaline to Litmus. Shake the mixture thoroughly. Separate and filter the benzol layer into a tared beaker. Repeat the operation with two portions of 10 c.c. each of benzol, mixing the separated and filtered benzol solutions with that first obtained. Evaporate the mixed solutions, on a water-bath, to dryness. Cool the beaker and residue in a desiccator and weigh. The commercial drug at present assays from 3–4 per cent. total alkaloid.

For assaying the Tincture and Fluidextract take 20 c.c. and 2 c.c. respectively and evaporate the Alcohol on a water-bath; mix with the lime magma and proceed as above.

The residues given by this method are practically white and crystalline. Results are remarkably constant as compared with previous assays, the weights rarely varying more than .001 in assaying the same sample.

[3] Total extraction of alkaloid is generally shown by absence of color in the Citric Acid Solution.

FRUITS OF RHUS GLABRA REPLACED BY FRUITS OF RHUS TYPHINA.*

By Henry Kraemer.

During the past ten years the official fruit of *Rhus glabra* has been replaced to some extent by the fruit of *Rhus typhina* or the Staghorn sumac. On several occasions recently the drug, which we have been purchasing for *Rhus glabra,* consisted entirely of the fruits of *Rhus typhina.* This replacement of one drug by another would seem to be rather common at present, yet it may be not more than was formerly the case. A careful study of even some of the official drugs on the market shows that several are entirely substituted not only by more or less closely allied species of the same genus, but even by widely separated plants. It is not the province of the pharmacognosist to determine if the substituted articles are equal to those that are official. Our task consists in the report of our findings. We may however ask the question, is it not probable that the reason for the demand, for a restricted materia medica by certain physicians, is due to the fact that some of the drugs which have been employed formerly and whose therapeutic value would seem to have been established, are in some instances replaced and substituted by other plant products, the therapeutic value of which not infrequently is unknown, and which in some cases are shown to be either very toxic or practically inert.

What is really reprehensible about this replacement of one drug by another is that it is usually done without our knowledge or consent. Then again we do not seem to consider it necessary, except in a very few cases, to study more than superficially the nature and quality of crude drugs. These matters I need not enlarge upon at this time as they have been discussed by me on several occasions before.[1] Suffice it to say that the pharmacognosist who uses the microscope in the examination of drugs and makes certain qualitative tests for characteristic constituents, often finds such a difference and alteration in the constituents in different commercial lots which only serves to emphasize again that we must give more attention to the subject of identity and quality of drugs rather than less as is advocated in certain quarters. We need only a few

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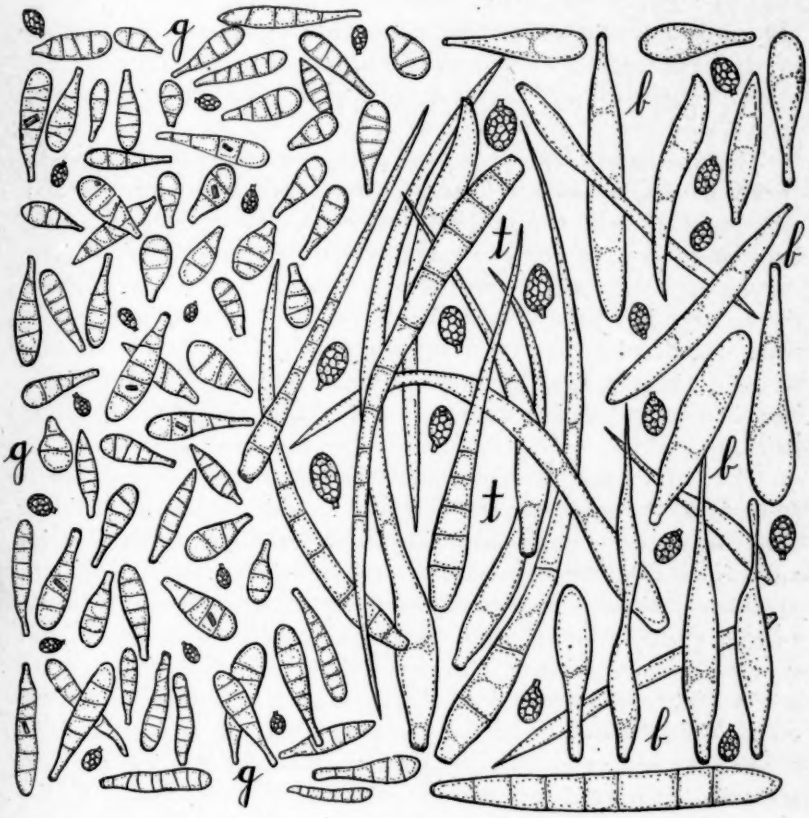
more instances of this replacement or substitution of drugs to call our attention to the need of directing our efforts so that the whole subject of collecting of drugs, as well as their commerce will be under some official control rendered effective by the organizations vitally interested in securing uniformity and efficiency of drugs.

FIG. 1.



Numerous non-glandular and a few of the small glandular hairs, covering the surface of the fruits of several species of Rhus. *g*, Rhus glabra; *t*, Rhus typhina; and *b*, Rhus glabra borealis.

RHUS GLABRA.

Rhus glabra is usually known as the "smooth" or "scarlet sumac," in allusion to the nearly smooth stems and scarlet fruits. It is a rather common shrub growing in dry soil in the Eastern United States, extending as far west as Arizona and northward into Canada.

The branches and leaves contain a milky juice. The leaves are compound, the leaflets being sharply serrate, dark green above and whitish beneath, and in the fall they turn to a bright scarlet with various shades of crimson, purple and orange. The flowers are in dense terminal panicles, being staminate or pistillate, the latter developing into small drupes, which are covered with short crimson hairs giving a velvety appearance to the fruits. The latter while fully grown in August do not ripen until October. Illustrations showing the panicles of fruits of *Rhus glabra* will be found in the second edition of my Text-book of Botany and Pharmacognosy, pp. 321 and 570.

The ripe fruits collected in October are official. They are nearly globular, ovoid or more or less reniform, somewhat compressed and vary from 2.5 to 4 mm. in length and from 2 to 4 mm. in width. Externally they are dark red and velvety with short hairs. The summit is usually surmounted with a short style, and at the base there is not infrequently seen the 5-cleft calyx attached to a short stalk or peduncle. The fruit is one-locular and one-seeded, inodorous, but when fresh with an odor of green apples. The fruits have an acidulous and slightly astringent taste due to the principles in the hairs.

The hairs upon the fruits of *Rhus glabra* are of two kinds. It is chiefly in the larger and those filled with a crimson, acid sap that contain the valuable constituents of this drug. These hairs vary from more or less broadly top-shaped or carrot-shaped, to spatulate and are also sometimes more or less narrow elliptical (Fig. 1, g). They vary from 100 to 400 microns in length, and are marked by transverse or oblique partition walls forming a 3- to 9-celled hair, the broader hairs having usually not more than three cells. When viewed under the microscope the cells are seen to hold a pink colored or a dark reddish-wine colored cell sap, and in glycerin mounts it is not unusual to find one or more crystals in the shape of small rods. In among these hairs are numerous glandular hairs with short one-celled stalks and multicellular heads. These hairs are globular or broadly elliptical, vary from 45 to 75 microns in length, are of a yellowish or reddish-brown color and in chloral hydrate solution there separates one or more oily globules on the outer membrane.

The calyx of *Rhus glabra* shows a few uncellular, somewhat curved non-glandular hairs from 50 to 125 microns in length, each

being very sharp pointed and with very thick walls. The small glandular hairs, if present, are relatively few.

The stems of *Rhus glabra* possess a number of glandular hairs with one- or two-celled stalks and multicellular heads. These hairs are from 10 to 20 microns in length. There are also quite a number of non-glandular hairs somewhat resembling those of the calyx but are much longer (as long as 100 microns). These latter sometimes have partition walls near the base dividing them into cells.

Rhus Typhina.

Rhus typhina is commonly known as the "staghorn sumac" in allusion to the soft brown pubescence covering the twigs and branches. It is also known as the "vinegar tree" and "Virginia sumac." It may attain the height of a tree, and is usually found growing in uplands in good soil, occasionally being found like *Rhus glabra* on barren gravelly banks. It is very abundant in the eastern United States and apparently sparingly distributed west of the Appalachian Mountains. It is by far more common at the present time than *Rhus glabra,* as the latter is being destroyed by reason of the construction of dwellings and also by the railroads that control much of the land in which it formerly grew.

The small branches of *Rhus typhina* are coated with long, soft hairs which are pinkish in the spring and as the stems grow older the hairs become bright green, and finally turn brown in the fall. On the stems of the second season the hairs are short and darker colored and very characteristic. The leaves and inflorescence show considerable resemblance to those of *Rhus glabra* (Fig. 2). The flowers are either staminate or pistillate and occur on separate plants. Both Wood[2] and Sargent[3] state that the flowers are occasionally polygamous. The fruit is a drupe resembling that of *Rhus glabra* in both form and size but is distinguished by being covered with long, nearly straight, needle-like crimson hairs.

It might be well at this point to consider the botanical synonym of *Rhus typhina.* In the Linnean herbarium there is preserved a specimen of the staghorn sumac in which the inflorescence is transformed into contorted bracts. This phenomena is not at all infrequent in this species and Linneaus in 1753 described this plant as *Datisca hirta.* Seven years later he described perfect specimens of the staghorn sumac as *Rhus typhina.* By reason of the law

of priority the specific name *hirta* should probably be used and yet by reason of long established usage we may well adhere to the name which has been most commonly used, namely *Rhus typhina.* It was used by Asa Gray [4] and is still retained in Gray's Manual revised by Robinson and Fernald [5] in 1908. Sargent uses it in his Silva of North America [3] and it is also adopted by Engler and Prantl in their Naturlichen Pflanzenfamilien.[6] While it is true that Britton has adopted the name of *Rhus hirta* (Linné [7]) Sudworth, yet in a note in the *Bulletin of the Torrey Botanical Club* [8] he says: "Although *hirta* is the oldest specific name associated with the plant, we are I think debarred from using it by the publication of *Rhus hirta* Harv. as a synonym by Engler in DC. Monog. Phan. IV. 425 (1883), where this is referred to *Rhus tridentata.*" This is confirmed in Index Kewensis and in which work *Rhus typhina* Linné also receives precedence.

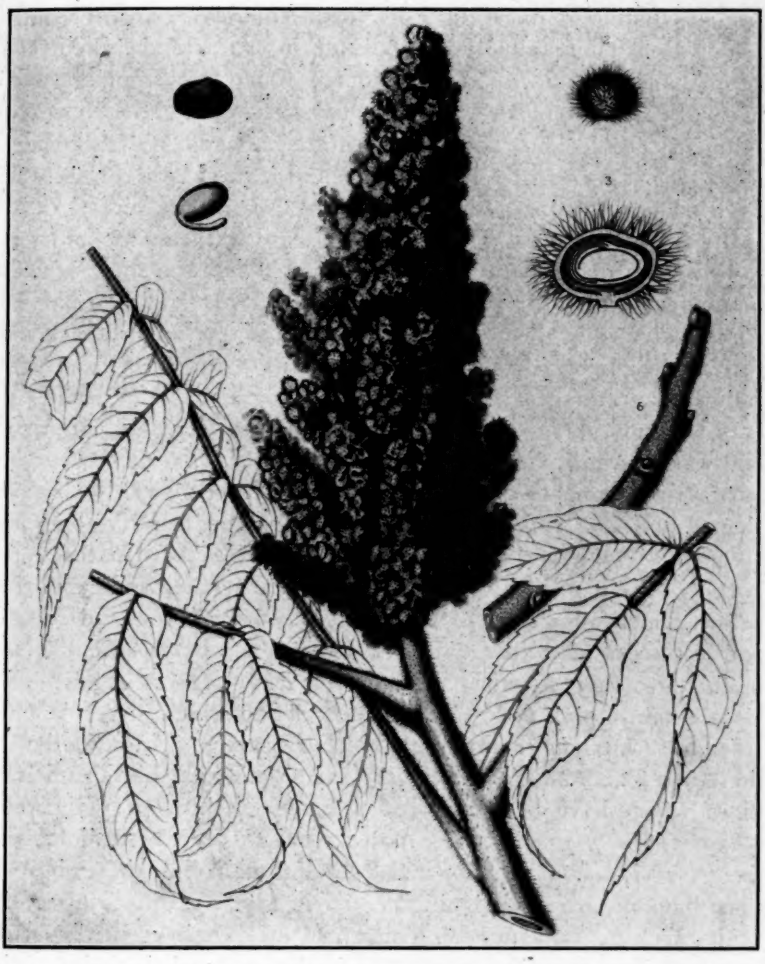
Our interest in *Rhus typhina* is that we may be able to detect the fruits of this plant in commerce. Fortunately this is very easily done as the fruits while superficially resembling those of *Rhus glabra* are darker and covered with long straight hairs giving it a characteristic spinose appearance. The hairs, however, are not indurated and are of a soft downy texture. As a matter of fact neither the panicle of fruits when attached to the plant nor the separated fruits in the drug can be mistaken for *Rhus glabra.* The hairs are long needle-like, varying from 750 to 1500 microns in length (Fig. 1, t). They are very narrow, gradually tapering and at the widest portion at the base do not exceed 50 microns in width. In the lower portion they are sometimes divided by transverse walls. The color of the cell sap and the other contents resemble those of *Rhus glabra.* Associated with these hairs are small glandular hairs varying from 75 to 120 microns in length. The upper or head-portion is more or less globular or elliptical in outline and the stalk is longer than in *Rhus glabra.*

The calyx of *Rhus typhina* is covered with hairs, these being of two types, the glandular and non-glandular. The stalks of the glandular hairs are much longer than the head portion and are usually made up of two superimposed cells. The non-glandular hairs of the calyx are similar to those found on the fruits of the staghorn sumac and may contain a similar red colored cell sap.

The hairs on the stems of *Rhus typhina* resemble those of the calyx but are much larger. The glandular hairs possess 3- to

4-celled stalks and nearly globular or elliptical, multicellular heads, the contents being of a pink or purplish-red color. The non-glandular hairs are very long, frequently over 2 mm. in length, more

FIG. 2.



Fruiting branch with leaves of Rhus typhina. Reproduced from Sargent's Silva of North America.

or less undulate in outline and have relatively thicker walls. The color of the cell sap in the non-glandular hairs varies with the age of the stems from which the sections were made, they are frequently

nearly colorless, the glandular hairs only having the colored sap and these possess it in the cells comprising the upper or head portion.

Rhus Glabra Borealis.

In a footnote in his "Silva of North America," Sargent [3] states: "Individual plants almost intermediate in character between *Rhus typhina* and *Rhus glabra* are occasionally found, indicating the possibility of natural hybrids between the two species." In the New York Botanical Garden Dr. Britton has labeled a number of specimens, *Rhus glabra borealis*. I have not examined these plants closely but have made a microscopical study of the hairs from several of the fruits of this material. The hairs are very characteristic and seem to be intermediate between those of *Rhus glabra* and those of *Rhus typhina* (Fig. 1, b). We find the characteristic spatulate hairs of *Rhus glabra* only they are much larger and as a whole much narrower, the upper portion tends to become obtuse and even acute rather than rounded. Again in certain specimens the hairs are very long and narrow resembling those of *Rhus typhina*. In a general way we can say the non-glandular hairs of *Rhus glabra borealis* vary from elongate-spatulate and narrow cylindrical to needle-shaped and are from 100 microns to 1 mm. in length. They are frequently cylindrical at the base and needle-shaped in the upper portion, or they may be spatulate in the upper portion and cylindrical below, and again they will have a needle-shaped base and summit and be constricted in the middle. They are more or less septate and in this also they resemble the hairs of *Rhus glabra*. These hairs also contain a pink or bright crimson cell sap which in permanency resemble *Rhus glabra* rather than *Rhus typhina*. Associated with these non-glandular hairs occur the small, glandular hairs similar to those which have been referred to under both *Rhus glabra* and *Rhus typhina*. In size these latter seem to be intermediate with those found on *Rhus typhina* and *Rhus glabra*. While these observations have no practical significance in the study of the drug, as the fruits are not found in the commercial article, they will doubtless prove of some botanical interest, as in the study of the hairs of the two species and their varieties we have a very simple means apparently of determining the extent to which hybridization may have taken place.

Chemical Constituents.

In the course of this investigation the question naturally arose as to the relative value of the several species of Rhus with hairy fruits containing a crimson, acid cell sap. A number of acids have been identified and these include malic acid, citric acid, gallic acid, and tannic acid. Some of these are free and may also be combined with calcium and possibly other inorganic bases. In order to get an idea of the relative amounts of free acid in these two species under consideration, infusions were made and these were titrated with a volumetric solution of sodium hydroxide. The method that was employed was the following: 10 Gm. of the commercial fruits, air dried, were ground in a wedgewood mortar and placed in a beaker with 100 c.c. of distilled water. The mixture was heated for from 15 to 20 minutes on a water bath and filtered through filter paper, the portion remaining on the filter being washed until the filtrate measured 200 c.c. This was then divided into two portions and titrated with a sodium hydroxide solution, each c.c. of which contained 0.004749 grams of sodium hydroxide. The infusions of these fruits yield solutions which are of a deep wine color and acid to litmus. Upon the addition of the alkali the color is first darkened, then changes to an olive-green, especially when viewed in thin layers. If at this point phenolphthalein is added and the titration carried further it will be found that nearly an equal volume of sodium hydroxide solution is necessary to neutralize it as indicated by the formation of a red color of the solution due to the phenolphthalein. It should be stated that this end reaction can only be accurately determined when the solution is viewed in thin layers. The technic in titration consists essentially in adding the alkali, drop by drop from a burette, to the original infusion of the berries until the color becomes an olive green, the phenolphthalein is then added and the titration continued until a slight reddish tint is observed. Specimens which were employed were fruits which had been gathered several years ago and it is likely that fresh fruits will show a higher per cent. of acidity.

The fruits of *Rhus glabra* have been of interest to investigators for a great many years and there are a number of papers of interest in this connection. The first chemical work on the nature of the acid sap of the fruits of *Rhus glabra* is that of I. Cozzens [8] in the *Annals of the Lyceum of New York* who reported that it contained

malic and gallic acids. W. B. Rogers [9] later proved that the malic acid was in the form of a calcium salt and outlined a method for obtaining it in crystalline form. In 1853 William J. Watson [10] made some quantitative studies on the fruits of *Rhus glabra* and showed that the amount of malic acid and bi-malate of calcium varied in the fruits collected at different months in the same year. Fruits collected in the latter part of August contained 0.50 per cent. of malic acid and 7.46 per cent. of bi-malate of lime. Specimens collected late in September gave 2.75 per cent. of uncombined malic acid and 3.50 per cent. of bi-malate of lime. He also determined qualitatively the presence of gallic and tannic acids. H. K. Bowman [11]

Name of drug	Quantity used	No. Cc. NaOH(V. S) 1 cc.=0.004749-NaOH	The percentage of acid in the fruits in terms of malic acid
Rhus glabra (old drug).....	5 grams	48.2	7.506
Rhus glabra (old drug).....	5 grams	51.8	8.067
Rhus glabra (whole fruits)....	5 grams	43.4	6.759
Rhus glabra (whole fruits)....	5 grams	41.7	6.494
Rhus typhina (whole fruits)..	5 grams	66.2	10.309
Rhus typhina (whole fruits)..	5 grams	50.2	7.818
Rhus typhina (drug).....	5 grams	72.1	11.228
Rhus typhina (drug).....	5 grams	71.4	11.119

later showed that the fruits of *Rhus glabra* contained 1.90 per cent. of tannic acid. John Stenhouse [12] conducted some rather interesting experiments on the tannin in sumac and came to the conclusion that the tannic acid in sumac was related to that found in allepo and Chinese galls. Henry Trimble [13] examined all parts of the plants of both *Rhus glabra* and *Rhus typhina* at different seasons of the year and found that the berries collected in September contained less tannin than those collected in August. Prof. Trimble [14] also reported on the amount of tannin found in the galls which were occasionally formed on *Rhus glabra.* In an article on "The Chemical Study of the *Seed of Rhus glabra,*" Frankforter [15] and Martin have given some very interesting results especially on the nature of the fixed oil found in the kernel of the seeds.

In completing this portion of the article there are a few references to the published work on the coloring matter of *Rhus glabra* that might be mentioned. The first article in which mention is made of the nature of this principle is that of Watson [10] already referred to. He considers that the true color is blue and that it is changed to red

by the action of the free malic acid present. As a matter of fact this is true practically of all plant color substances as I [16] have shown in an article on "The Origin and Nature of Color in Plants." An interesting observation is that of Palen [17] who reported that the coloring principle in the leaves of *Rhus glabra* seemed to resemble that in quercitron bark, meaning thereby probably the bark of the black oak (*Quercus velutina,* Lam.). Perkin and Allen [18] isolated the coloring matter in Sicilian sumac (*Rhus coriariæ*) and found it to be identical with myricetin, the coloring matter of *Myrica nagi,* and are of the opinion that the different species of *Rhus* do not contain either quercetin or quercitrin. It will thus be seen that there are many interesting phases of study of the several species of *Rhus,* the fruits of which are clothed with acid crimson hairs. Some additional comparative work in which the fruits of *Rhus copallina* L. were used, will be reported upon later.

REFERENCES TO LITERATURE.

[1] Henry Kraemer, *Amer. Jour. Pharm.,* 82, 1910, p. 51; 85, 1913, pl.

[2] Alphonse Wood, Class Book of Botany.

[3] Charles S. Sargent, The Silva of North America, vol. 3, p. 16.

[4] Asa Gray, Manual of Botany of the Northern United States, 6th ed., 1890, p. 118.

[5] Benjamin L. Robinson and M. L. Fernald, A Handbook of the Flowering Plants and Ferns, 1908, p. 552.

[6] A. Engler, Anacardiaceæ in Engler and Prantl's "Die naturlichen Pflanzenfamilien," p. 168.

[7] Nathaniel Lord Britton, *Bulletin Torrey Botanical Club,* 18, 1891, p. 269.

[8] I. Cozzens in *Annals of the Lyceum of New York,* referred to by W. B. Rogers in *Amer. Jour. Pharm.,* 7, 1835, p. 56.

[9] William B. Rogers, *Amer. Jour. Pharm.,* 7, 1835, pp. 56–62.

[10] William J. Watson, *Amer. Jour. Pharm.,* 25, 1853, pp. 193–198.

[11] Henry K. Bowman, *Amer. Jour. Pharm.,* 41, 1869, p. 195.

[12] John Stenhouse, *Amer. Jour. Pharm.,* 34, 1862, p. 253.

[13] Henry Trimble, *Amer. Jour. Pharm.,* 72, 1900, p. 337; *Ibid.* 75, 1903, p. 344.

[14] Henry Trimble, *Amer. Jour. Pharm.,* 62, 1890, p. 564.

[15] G. B. Frankforter and A. W. Martin, *Amer. Jour Pharm.,* 76, 1904, pp. 151–158.

[16] Henry Kraemer, *Proc. Amer. Philosoph. Soc.,* xliii, 1904, No. 177, pp. 257–277.

[17] Joseph A. Palen, *Amer. Jour. Pharm.,* 60, 1888, p. 389.

[18] Perkin and Allen, *Proc. Chem. Society,* 1896, p. 157 abstracted in *Amer. Jour. Pharm.,* 68, 1896, p. 687.

A SIMPLE AND CONVENIENT DEVICE FOR HANDLING HOT EVAPORATING DISHES.[1]

By Charles H. LaWall.

The lifting, holding or transferring a hot evaporating dish is frequently very inconvenient. The crucible tongs, although sometimes used, are not well adapted for the purpose of handling any but the smaller dishes. For handling dishes varying from six inches in diameter upward they are very risky to use.

Test tube holders are even less well adapted than crucible tongs and the method which is frequently, or, one might say, generally employed, that of using a towel or a piece of cloth, is decidedly unsatisfactory and unprofessional.

A satisfactory device which may be made in a few minutes by anybody who has a large cork and a sharp penknife has been in use by me for a long time with great success.

Take a No. 10 or 12 cork and, beginning at the small end, cut a slit in it slightly wider than the thickness of the dish and running back about three-fourths the length of the cork. When completed this makes a springy handle which can be slipped over the side of the dish and firmly grasped with the fingers without danger either of burning them or contaminating the contents of the dish. For large or heavy dishes, two of the improvised handles may be used, one being slipped over each side of the dish when it is to be moved.

THE NATIONAL FORMULARY AND PROPRIETARY REMEDIES.[1]

By M. I. Wilbert, Washington, D. C.

It has been repeatedly asserted that the National Formulary is designed to be of value primarily to those who would make preparations in imitation of popular proprietary remedies and individuals who are more or less directly interested in the exploitation and sale of nostrums have dilated on the wrongfulness of this practice to such an extent that many otherwise well informed physicians

[1] Read at the annual meeting of the Pennsylvania Pharmaceutical Association, June, 1913.

and even pharmacists are actually convinced that there is an element of truth in the assertion that the National Formulary is at best but a compilation of formulas for poor imitations of widely used, original and medicinally valuable remedies.

This accusation, while it sounds formidable, will not bear careful analysis, for the preparations represented in the National Formulary can readily be shown to be: 1. Not imitations in any sense of the word because the preparations of which the N. F. preparations are said to be imitations are themselves not original and have nothing to be imitated except the method of their exploitation. 2. Not indispensable or even medicinally valuable despite the fact that some of them are widely used.

That the National Formulary does not and of necessity cannot include formulas for preparations that are indispensable or even particularly valuable must be conceded when we call to mind the fact that the Pharmacopœia of the United States has for nearly a century included formulas and standards for all of the really valuable remedies known to American medicine. The completeness with which this is done is reflected by the frequently made assertion that the Pharmacopœia contains an over abundance of material and at the present time includes many articles that are neither valuable nor indispensable, while the number of really useful galenicals that are not recognized by the U. S. P. is indeed small; granting that there are any.

The National Formulary is not and never was intended to be other than a repository of formulas for preparations, good, bad or indifferent that have been recognized in current literature or are being experimented with by physicians and for which there is need for establishing a uniform standard of strength so as to avoid variable and possibly untoward results from the use of preparations differing in composition or strength at the will of the maker.

The primary and the only valid object then, in including the formula for a preparation in the National Formulary, is to give that preparation the benefit of any doubt as to its possible usefulness and by securing uniformity in composition and strength for a reasonable period of time, allowing medical practitioners to determine impartially by experience and observation the utility or the uselessness of the combination for the purposes for which it was thought to be useful.

This brings up again the question of originality and the accom-

panying question of property right in an invention or a discovery.

Broadly speaking, there is no such thing as originality and all invention or discovery is at best but a new application of established knowledge or a combination of established principles in a way not apparent to or recognized by the general public.

This thought, conception or discovery is and must of necessity remain the property of the originator so long as he cares to keep it to himself but becomes public property so soon as the originator communicates it, either by word of mouth suggestion or otherwise to others.

To foster the development of human knowledge and to promote progress in science and the useful arts civilized governments have instituted patent laws ostensibly designed to establish the property rights of an individual in an invention but in reality used to serve as an incentive to others to improve and to enlarge upon the progress recorded. The courts, in this country at least, have elaborated on this principle and have ruled that under established laws an inventor or discoverer has a right to the exclusive enjoyment of his invention or discovery and that his right is secured to him for a limited but definite period of time by our patent laws and for an indefinite period of time by strict secrecy.

Thus it has been decreed (Tabor *v.* Hoffman, 118 N. Y., 30–8) that "independent of copyright or letters patent an inventor or author has by the common law an exclusive property in his invention or composition, until by publication it becomes the property of the general public." Publication has in turn been defined as the freely giving or the selling of a composition or an article to another which other person may impart his knowledge of the article to others or further elaborate on the discovery or invention and thereby secure for himself such property right in the elaborated invention as may be available under the provision of existing laws.

Thus in the same case quoted above (Tabor *v.* Hoffman, 118 N. Y., 30–8) the New York Court said: "If a valuable medicine is not protected by patent, is put upon the market, anyone may, if he can by a chemical analysis and a series of experiments, or by any other use of the medicine itself aided by his own resources only, discover the ingredients and their proportions. If he thus finds out the secret of the proprietor he may use it to any extent that he desires without danger of interference by the courts."

As suggested elsewhere patents, under our existing patent laws, are but a reflection of the development of general knowledge along any particular line and demonstrate our lack of knowledge by establishing the degree of originality that is thought to be sufficient to secure a patent.

Under the patent laws now in force in this country it has not been possible for nearly a century to obtain a patent on a formula for a mixture of substances for use as medicine or to secure a property right in any such formula by any other means than absolute secrecy, as suggested above.

There being no legal basis for property right in a formula or medicinal preparation consisting of a simple mixture of well-known substances, it may be held that the maker or the originator of such a mixture might have a moral right to the exclusive use of such a formula or mixture, even after giving to it the degree of publicity involved in the sale of the medicine for profit. Here, however, the larger and broader rights of the people as a whole must be considered and the problem again resolves itself into a matter of publication, exploitation, or sale. Under our common law practice the public has a right to assume that all matters of general knowledge are public property to be used or restricted as the majority of the people think best. The public also has a right to assume, and the experience has demonstrated the correctness of the assumption, that there is no available method by means of which the output of a secret formula can be controlled so that from the point of view of public policy the use of proprietary secret or semi-secret medicinal preparations should be discouraged. It has well been stated that in matters of medicine the public should above all disregard personal and financial considerations since the question resolves itself into a need for accomplishing the greatest and most permanent good for suffering humanity. The public health and the protection of the general welfare of the public are first to be thought of, and any thing that stands in the way of promoting this general welfare must be considered as being negligible or even objectionable.

To sum up the problem it would appear that, from any available point of view, the cry of imitation that has been raised against National Formulary formulas is unwarranted. The National Formulary is to all intents and purposes a public work compiled and

used to promote the best interests of the public and to safeguard the public health.

While it is true that originally the National Formulary was compiled by an association of pharmacists to bring a degree of relief to the followers of their craft who were being oppressed by commercial conditions that were evolved largely through falsehood and misrepresentation, it is also true that the book has developed to be and must continue to be a factor in the elimination of ignorance and hypocrisy from the practice of medicine.

Just a little sober thought devoted to the subject will convince even the skeptical that while the National Formulary has done much to promote the evolution of American Pharmacy along professional lines its direct and indirect influence in the way of establishing the therapeutic uses and limitations of drugs and preparations of drugs on a firm scientific basis will prove, in time, to have been its greatest achievement.

THE PROPOSED METHOD OF MICROSUBLIMATION FOR THE DETECTION OF ÆSCULIN AND THE IDENTIFICATION OF GELSEMIUM.[1]

By Frank Tutin.

In some recent "contributions to applied plant microchemistry," O. Tunmann has proposed a method for the detection of æsculin by the microsublimation, which he considers especially adapted for the identification of gelsemium.[2] It is stated that when a small quantity of the ground drug, or a section of the rhizome or root, is placed between two microscope slides, and suitably heated, a characteristic crystalline sublimate of æsculin is obtained. The sublimate is recognized with the aid of the microscope by its appearance, crystalline form, and certain reactions. It is furthermore stated that æsculin, when examined by the micro-chemical method, does not behave as it does under the conditions of an ordinary

[1] A communication from the Wellcome Chemical Research Laboratories, London, E.C., and reprinted from *The Pharmaceutical Journad and Pharmacist,* February 10, 1912.

[2] *Apoh. Zeit.,* 1911, **26,** and *Pharm. Journal and Pharmacist,* 1911, **87,** 849.

chemical experiment. Thus, in chemical literature, æsculin is stated to lose its water of crystallization at about 130°, to melt at 160°, and to decompose, yielding æsculetin and dextrose, at about 230°. Tunmann states, however, that when examined by the microsublimation method, æsculin melts at 49–50°, sublimes readily at 58–60°, and may even be sublimed out of gelsemium at so low a temperature as 40°, no decomposition occurring. The author finally claims that the method is of such value that it should be adopted by the Pharmacopœias as a test for the identity of gelsemium.

In view of certain facts, however, it appeared to the present author that the subject required further investigation. In the first place, the suggestion that the chemical and physical properties of a compound can be greatly altered by the conditions under which it is examined cannot be entertained. A small amount of a compound will melt at the same temperature when heated between two microscope slides as when heated in a capillary tube in the ordinary manner, and it will not become more volatile by being examined under a microscope. In the second place, gelsemium does not contain any æsculin, and therefore Tunmann cannot have obtained a sublimate of this compound from the drug in question.

The fluorescent principle in gelsemium has been shown to be scopoletin (æsculetin 5-methyl ether), and not æsculin.[3] Sonnenschein,[4] whose work is referred to by Tunmann, stated that he isolated æsculin from gelsemium, but a consideration of the method employed by him renders it evident that the compound he obtained could not have been the glucoside in question, and must have consisted of scopoletin. Thus Sonnenschein states that the drug was extracted with a mixture of equal parts of alcohol and water, the extract concentrated, and deprived of resin. The liquid was then treated with basic lead acetate, the precipitate collected, suspended in water, and decomposed by means of hydrogen sulphide, the crystalline compound being obtained by extracting the resulting liquid with ether. He also states that a further amount of "æsculin" was obtained from the filtrate from the basic lead acetate precipitate by extraction with ether, after the removal of the lead by means of hydrogen sulphide. Not a trace of æsculin, however, can be removed from its aqueous solution by extraction with ether,

[3] Moore, *Journ. Chem. Soc.*, 1910, **97**, 2223; 1911, **99**, 1043.
[4] *Ber.*, 1876, **9**, 1182.

whilst scopoletin, on the other hand, may readily be removed by this means. Furthermore, it is stated by Sonnenschein that the "æsculin" obtained by him from gelsemium is identical with the "gelseminic acid" of Wormley,[5] but the latter compound has been shown by Schmidt[6] to be scopoletin.

Unfortunately, the statement that æsculin is present in gelsemium now occurs in several standard works, such as Beilstein's "Handbuch," but these statements are in every case attributable to the incorrect observation of Sonnenschein.

With consideration of the above facts it was deemed desirable to ascertain the behavior of anhydrous æsculin, æsculetin, scopoletin, and finely ground gelsemium on heating. Small quantities of the materials in question were placed in small, thin glass tubes, the open end sealed, and the substances then simultaneously heated in a metal bath, the temperature of which was recorded by a thermometer placed in the liquid. At 140° the scopoletin just commenced to sublime, and at 150° a distinctly crystalline sublimate was obtained from it. The temperature was then raised to 170°, at which point it was kept for several hours. The scopoletin then sublimed fairly rapidly, yielding almost colorless, well-formed crystals. The gelsemium also yielded a small sublimate, which was, for the most part, composed of crystals of scopoletin. The æsculin gradually melted, and darkened somewhat, slowly yielding a slight sublimate of tarry matter, containing no crystals, whilst the æsculetin remained unchanged. The temperature was then raised to 210°, and again maintained constant for several hours, when the scopoletin fused, and sublimed rapidly. A further sublimate was obtained from the gelsemium, but was largely of a tarry nature, whilst the æsculetin slowly sublimed in pale yellow crystals. The æsculin suffered gradual decomposition, giving a further sublimate of tarry matter, together with crystals of æsculetin, the identity of which was proved by the melting point (264°).

It is thus evident that the sublimate obtained by Tunmann from gelsemium must have consisted of scopoletin, and not of æsculin, as supposed by him, and that the temperature to which he heated the drug must have been at least 100° higher than he has stated.

In connection with these experiments the melting-point of æsculin

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[5] *Amer. Journ. Pharm.*, 1870, **42**, 1.

[6] *Arch. Pharm.*, 1898, **236**, 236.

has been redetermined. It has been found that the glucoside in question does not melt at so low a temperature as 160°, unless it has become partially decomposed by very slow or prolonged heating. When heated fairly rapidly, in the ordinary manner, fusion occurs at 200–202°.

The observations recorded in this note readily explain why it was that Tunmann failed to obtain any satisfactory sublimate from the bark of *Æsculus hippocastanum,* which is known to contain a fairly abundant amount of æsculin, but which, so far as known, is devoid of scopoletin.

The detection of scopoletin in gelsemium may, however, prove to be a valuable means of distinguishing this drug from others of a similar appearance, such as that derived from *Gelsemium elegans,* Benth., but it is doubtful whether the sublimation method is the most convenient one. If 0.5 gramme of ground gelsemium be heated in a test tube with chloroform, the mixture filtered, and the filtrate shaken with water to which a few drops of dilute ammonia have been added, the aqueous layer, on separation, will be found to show a distinct, blue fluorescence, thus indicating the presence of scopoletin.

A COUNSEL OF PERFECTION: A PLAN FOR AN AUTOMATIC COLLECTION AND DISTRIBUTION OF A STATE TAX FOR HIGHER EDUCATION.[1]

By J. G. Rosengarten.

The example of the western state universities suggests a similar organization for other states. Here in Pennsylvania the University, dating from 1740, when under the inspiration of Whitefield, the plan of a school was first mooted, has outgrown its modest endowments. Biennially it goes to the legislature to ask help to carry on its work. In the interval it appeals to its alumni and friends for help to meet its pressing needs, higher salaries, a larger teaching force, and more buildings and appliances for its multifarious educational needs.

What is true of the University of Pennsylvania is true of all

[1] Read at the Annual Meeting of the American Philosophical Society, April 17, 1913, and reprinted from the Proceedings of the Society, **52**, 1913, pp. 243–256.

other universities and colleges of Pennsylvania, and of the East and South, and no matter how large their endowments and income, each and all require more money to keep pace with the growing expenses of higher education in the modern university.

It needs no apology to broach the matter here, for Franklin founded both the American Philosophical Society and the University of Pennsylvania. In fact after the Revolution the charter of his College of Philadelphia was taken away, and a Charter given to the University of the State of Pennsylvania, and the constitution affirmed the duty of the state to help it. Later the charter of the college was restored, and still later the college and the university were united in the University of Pennsylvania, and it has grown to its present great estate under that charter and that name.

From time to time the state has aided it, and private munificence has enabled it to provide the splendid buildings in which it is now housed, with College and Law and Medical Departments, and to maintain in Towne Engineering School, and the Wharton School of Finance and Economy, and the Zoölogical and Dental and Veterinary Schools, and a long list of endowed Professorships and Fellowships and Scholarships and prizes. With all these, and the other resources of the university, there is still an annual deficit which must be met. To do so would require an additional endowment sufficient to provide an income of half a million dollars to meet the needs of the university. How to provide this is a question that taxes the university authorities and exacts time, thought and anxiety of provost, trustees, faculty and alumni, when they ought to be free to give attention to the work of instruction and to raising the standard of education in all its departments.

Illinois, Indiana, Iowa, Montana, Wisconsin, are among the western states which have state universities. In their state constitutions provision is made for an automatic assignment of a small part of the state taxes for their support. Thus all appeal to the state legislature for support is made unnecessary. In Wisconsin, and in many other universities, colleges, etc., the United States Land Grant is made part of the endowment of the state university, and for agricultural and technical schools. Iowa has recently put all its educational institutions under a single governing board. All the western universities have out of the increasing wealth and revenues of their states provided incomes growing in proportion to their needs, and their activities keep pace with them. University exten-

sion lectures carry their teachers to every part of their state, and every branch of education is fostered under intelligent guidance, with university men spreading the influence for higher and better education.

A constitutional convention is soon to be called in Pennsylvania. There a plan should be formulated, submitted and discussed for a reorganization that may strengthen institutions of higher education in Pennsylvania. The plan and method of securing automatically a portion of the state revenue for the purpose of education are now in force in twenty-one states, so that there is little novelty in the idea, for it has been in practical operation in all of them, with various differences, and yet almost uniformly successful results. Only recently, in acknowledging a paper on German Universities, that Nestor of both American and German universities, the Hon. Andrew D. White, of Cornell, wrote:

"It is doing a duty to the country to call attention to the evils caused by the scattering of resources among so large a number of institutions bearing the name of 'University.'

"The worst affliction of our whole existing system is the fact that such a multitude of institutions which ought to be called 'Colleges' are pretending to do University work, while they are in no condition to do the duties worthy of that name.

"What the country needs is a concentration upon a smaller number of Universities, with a large number,—no matter how large indeed,—discharging a function akin to that of the 'Gymnasia' in Germany, which might very honorably be called 'Colleges.' An example of a better practice may be found in some parts of New England, where institutions, some of which were up to a recent time called 'Universities,' have become frankly 'Colleges.'

"We are about to have Universities which will give us high rank throughout the World, and among them especially the State Universities of the West, as well as some that have been established upon large foundations in the eastern part of our country.

"As to the Western State Universities, their progress is simply amazing. There has been developed an honorable pride in them by their respective states, and this has been deepened by a very honorable rivalry between sundry commonwealths, as for example Michigan, Wisconsin, and Minnesota, which has resulted in a magnificent fruitage.

"While the standard of scholarship is kept deplorably low in some of the smaller Universities, it has been steadily rising in many of the better endowed institutions. The increase of lectures by distinguished foreign professors at various American Universities of the better sort, will be productive of great good. Cornell, for example, is about to have an extended course of lectures on American History, by a renowned Oxford Professor upon

the Goldwin Smith Foundation. Who would not gladly exchange our scattered flock of Universities and Colleges, running up into the hundreds, for the twenty-two Universities of Germany?"

There too the important cities of Hamburg and Frankfurt are about to coördinate all their existing institutions of science, art and literature, into great metropolitan universities, retaining all the useful elements of successful and thorough education and training, and elevating the standard of work.

Against the twenty-four universities, and nine technical schools, of Germany, the last report of the Commissioner of Education of the United States reported nearly five hundred universities and colleges for men, and one hundred and thirty for women, and over one hundred and fifty technical schools, nearly one hundred law schools, and proportionately numerous medical, dental, pharmaceutical, and other allied special schools. With this enormous disparity in numbers, it is easy to see why the German schools and universities do their work thoroughly and well.

The state regulations and examinations for the bar and for medicine and various other professions and employments, show the need felt for something more than the diploma of university, college or technical school.

A state university, representing, in its government, all the institutions of instruction in education, in all its varieties, general and technical, would give strength to each and all of the schools affiliated with it, and its degrees, awarded on their recommendation, would be greatly enhanced in value.

The first step in Pennsylvania would be to take advantage of the proposed constitutional convention, and introduce into the new state constitution,

First.—Provisions for an automatic appropriation of part of the revenue of the state, to higher education, to be distributed in the maintenance of a University of the State of Pennsylvania, and allied colleges and technical schools, thus going back to the wise provision of the Constitution of 1779.

Second.—Legislative power to strengthen and increase the power of the College and University Council, with the Governor, the Superintendent of Public Instruction, the Attorney General, State Officers, ex-officio, and the presidents of the University of Pennsylvania, Pittsburgh, Lehigh, Bucknell, and of Washington,

Jefferson, State, Franklin & Marshall and other colleges and other institutions, the members.

Third.—To give that board power to distribute the state educational fund among the state universities, colleges, technical schools and other institutions of learning, science and art, on such terms as to numbers of teachers and students, standards, and other conditions as may be prescribed by the college and university council.

Fourth.—To make all universities, colleges, technical schools and institutions for higher education, branches of the university of the state, retaining their names, organization, endowments, etc., but requiring annual returns of all the details of numbers, income, work, etc., on a uniform basis, with provision for inspection, audit, examination, so thorough that the highest standard of efficiency may be secured and maintained, under the penalty of losing any claim to the income from the state education fund; the council to have the right and privilege of approving and recommending the degrees in course conferred by the university and other universities and colleges of the state, with power to revoke or modify charters of any affiliated institution for cause.

Fifth.—The college and university council to have power to consolidate existing institutions working in one district or multiplying the work that could be better done by one strong institution, thus giving to the state one or more medical, legal, technical or other schools, in lieu of an unnecessarily large number of small schools, weakened by competition, lessening standards, and not really serving the state, owing to insufficient means and inefficient methods.

Sixth.—Uniting with the state university, libraries, university extension work, scientific and art and technical schools and museums, in such a way that all unnecessary duplication may be prevented, and higher education ensured through uniform grants form the state educational fund.

Seventh.—The college and university council to have the inspection of the normal schools, in such a way as to unite in close sequence the methods of education, from the public and private schools, the normal schools, etc., through the colleges and technical schools and up to the university.

Twenty states have made provision in their constitutions for automatic collection and distribution of a small part of the revenue of the State to aid in the work of education of its people, and Pennsylvania should make similar provision in its new constitution. It

would increase the efficiency of its institutions of learning, relieve the legislature of a task which is no part of its proper duty, free the trustees and officers and faculties of our universities and colleges from the necessity of going to the legislature and the governor of the commonwealth, give them a right to a part of the state revenue thus set apart for education, elevate the standards and enhance their efficiency, by allying them with the University of the State of Pennsylvania, and give their degrees a position recognized through the state and beyond it.

This may be a counsel of perfection, but none the less well worth discussion and careful consideration by the American Philosophical Society, true to its purpose of promoting useful knowledge. What can be more useful than to know how best to bring to bear on education the means and methods of securing that which is best fitted to prepare men and women to be good citizens, to teach them all that is necessary, to secure them the best schools for every profession and occupation, and to reform existing institutions of learning, so that they may do the greatest good to the largest number?

Make the state supply from its plethoric treasury, the money required for higher education, as it does for secondary and elementary schools, and then the distribution may be safely put into the hands of the state's college and university council, composed of state officers and the representatives of the universities and colleges and technical schools. Among them will be found men who will see that the state's money is well spent, with a proper distribution between buildings and maintenance, salaries and expenses incidental to instruction.

The state will supply through its *ex-officio* members and its trained inspectors due protection against undue expenditure of any kind.

The state college and university council may properly insist that wherever money is given for any special purpose, it shall be enough to provide for future maintenance, and not be, as it too often is the case to-day, a burden on income. There are plenty of reforms incidental to a reorganization of our institutions of learning, that will need the careful consideration of the state college and university council. A few years will serve to show how unnecessary duplication of work can be prevented, how neighboring colleges can be united into one strong college, how technical and professional

schools can be strengthened by reducing their number, and increasing their efficiency, how an exchange of professors may be systematized to the advantage of teachers and students, and how the standard of education may be raised.

Much will be done by the teachers themselves, and there can be no better inspiration to improve methods than to draw from the great body of men trained in the work of education, the results of their experience. Of course there will be impracticable suggestions and unworkable plans proposed, but those will all be submitted to the trained and experienced members of the State college and university council, and after full discussion, their judgment will choose the good and reject the bad. Plans and methods of teaching will be entrusted to experienced teachers, and the profession will rise in dignity and importance, as the work shows the good results of their experience, knowledge and ability. All this and much else can be accomplished if the new constitution of Pennsylvania makes the business of education a matter of state support and state government.

Andrew D. White, that Nestor of Higher Education in this country, first president of Cornell University, and always its inspiration, read a paper on "Advanced Education," before the National Education Association at Detroit, in 1874. Urgent arguments are brought forward for a reorganization of American universities and colleges and technical schools as part of the work of the state. Dr. White urges the necessity of careful public provision by the people for their own system of advanced instruction as the only republican and democratic method. Public provision, he said, is alone worthy of our dignity as citizens. It will stimulate private gifts and free them from the dogmas of living donors and dead testators. The nucleus of Cornell University was the national land grant, which has been supplemented by an increasing flow of private gifts to the endowment.

The state of Michigan made the national land grant the foundation of its great university, and has added to it from time to time with the best results. It has thus strengthened the whole system of public education throughout the state. The national grant and the state grant together have thus been united to make a great university, and provide the endowment of advanced instruction, and to coördinate education from the primary school to the highest technical and scientific and classical and collegiate and professional training.

Such an example and that of twenty other States all point to the best way of meeting the general demand for a more regular and thorough public provision for advanced education, not through appeals to legislatures, to be subject to all the risks of overtaxed public bodies, but by a constitutional provision for a fixed, though small, percentage of the income of the State to be set apart for higher education and for all branches of education that ought to be maintained at the public expense, to be expended through the college and university council, made up of state officials and representatives of universities and colleges and institutions of advanced scientific and technical education. Established by law in 1895, it only needs increased power to do its best work.

Well directed public bounty, as President White says, stimulates private bounty. Generous men and women, seeing that the current needs of such institutions were provided by state revenue, would gladly give freely and largely for such special additions as may appeal to them. The alumni of universities will find new inspiration for their activity in giving, advising, and encouraging the growth and prosperity and advancement of their alma mater. Thus, nation, state, alumni and individual grants and gifts would be united to strengthen state institutions and enable them to give the highest literary, scientific and industrial instruction.

The same trend of educated opinion is found in other publications of the highest authority. In the 44th annual report of the Smithsonian Institute, that for 1889, Professor Herbert B. Adams's paper on the state and higher education gives the strongest facts and arguments in support of state aid. He points out that in colonial days Maryland began her educational history by paying a tobacco tax for the support of William and Mary College in Virginia. Vermont appropriated a township of land for Dartmouth College in New Hampshire. New Haven sent corn to the support of Harvard. In later times Michigan gave to the university one-twentieth of a mill tax on every dollar of taxable property; Wisconsin one-eighth of a mill; Nebraska three-eighths of a mill; California one-tenth of a mill; and now the same rule holds in so many states that it may be described as the normal basis for state aid to higher education.

In the proceedings of the National Education Association there are abundant evidences that the leading and recognized authorities on education in this country take the same view.

In the report for 1900, President Swain, then of Indiana Univer-

sity, now of Swarthmore, gave a sketch of the history of the promotion of higher education by the state from early times until the present. He gives forty-five as the number of colleges and universities supported by the state, and points to seven representative state universities—California, Illinois, Kansas, Michigan, Minnesota, Nebraska, Wisconsin.

President Beardshear of Iowa State College of Agriculture, said there were 64 colleges or departments inaugurated by the Act of Congress of 1862, making land grants for the establishment of schools for mechanical and agricultural instruction.

Again at the National Education Association meeting of July, 1901, President Jesse of the State University of Wisconsin, read a paper on the "Function of the State University." He points out the opportunities for collaboration with state boards, bureaus and commissions, with a view to serious study of social and economic conditions.

To-day and in and by our own university much is done for the state and the city, but as a matter of grace; make it the university of the state, and state and city would ask for help as a matter of right. Social and economical and legal problems would be attacked and solved. By coöperation with boards of education and state and local superintendents, the university would help to build up schools, from primary to normal, by trained inspectors, skilled examiners, lecturers, practical teachers. Colleges and higher technical schools should be brought into union with the university, all working towards the common end and aim, the best education of the largest number.

The university of the state should be in close touch with all the state boards, bureaus and commissions, the geological survey, the bureaus of health, education, forestry, mines, industries, all the innumerable functions and activities of the state. The university should help in the preparation of laws governing taxation, every day growing more complex, and in every form of economic instruction, for the benefit of the state in its legislation, and of the plain people. In Pennsylvania, mining, metallurgy, manufacturing, forestry, light, heat and power, are among the living issues that require sound legislation and to prepare it should be one of the functions of the university of the state.

The United States Bureau of Education publishes annually a Bulletin of Statistics of State Universities. These include a direc-

tory of state universities and other state-aided institutions of higher education, noting specially those endowed by the federal government under the Morrill Land Grant Acts. These numbered 87, besides 16 agricultural and mechanical colleges for colored students, in the list for the year ended June 30, 1912. There are tables showing the teaching force, the student enrollment, the property and income of the 87 state universities and state-aided institutions.

State universities and state-aided institutions of higher education included in this list, corrected by figures of Professor Maphis' Report, are as follows:

		Income from Mill Tax.
Arizona	3/5 of a mill	32,000
California	22.5/100 of a mill	750,000
Colorado	3/5 of a mill	223,000
Illinois	3 mills	
Indiana	1/10 of a mill	173,000
Iowa	1/8 of a mill	
Kentucky	1/2 of a mill	47,000
Michigan	3/8 of a mill	650,000
	1/10 of a mill	173,000
Minnesota	23/100 of a mill	260,000
Nebraska	1 mill tax rate	411,000
Nevada	1/2 mill tax rate	
New Mexico	65/100 mill tax rate	
North Dakota	1/5 mill tax rate	
	33/100 mill tax rate	
Ohio	17/2000 mill tax rate	92,000
	107/2000 mill tax rate 540.000	366,000
	17/2000 mill tax rate	88,000
Texas	1–3/4 p. c. gross revenue of state	
Utah	7.94 p. c. of 4–1/2 mills on the dollar	
Utah	18.04 p. c. of 4–1/2 mills on the dollar	
Wisconsin	3/8 mill tax rate	664,000
Wyoming	1/2 mill tax rate	24,000

President James of Illinois State University, says the Legislature of Illinois at its last session (1912) passed a law providing that a tax of one mill for every dollar of assessed valuation should be levied for the support of the university. This will give about two and a quarter million dollars per year, available July 1, 1913. Owing to the provision in the constitution of Illinois that the legislature may not make appropriations for longer than two years, the legislature must appropriate at each session the money represented by this mill tax and labeled for the support of the University of Illinois.

Michigan and Wisconsin provide for the levying of a certain so-called mill tax, three-eighths or four-fifths of a mill, the proceeds of which are turned over to the board of trustees of the beneficiary institution.

The statistics of state universities and other institutions of higher education partially supported by the state for the year ended June 30, 1912 (*Bulletin*, 1912, No. 33), give a great many details, among them a table of property and income of state universities and other state-aided institutions, showing that there were paid—

	By the State.	By the United States.
To the University of California	1,124,506	80,000
To the University of Indiana	1,918,900	79,938
To the University of Minnesota	2,314,713	80,000
To the University of Missouri	610,093	76,875
To the University of Nebraska	651,318	80,000
To the University of Cornell	478,000	72,000
Ohio { Miami University, Ohio University, Ohio State University }	1,131,778	50,000
To the University of Wisconsin	1,552,398	80,000

The same table gives the receipts from the mill tax and other sources of some of the states, as follows:

Colorado (4 institutions)	406,053
Indiana (2 institutions)	259,504
Iowa (3 institutions)	407,200
Michigan (2 institutions)	932,867
Minnesota	689,521
Nebraska	374,163
Ohio (2 institutions)	480,828
South Carolina	114,113
Utah	150,000
Wisconsin	1,103,029
Wyoming	84,000

The same table gives among the many private benefactions to those state-aided universities:

California	566,000
Nevada	150,000
Cornell	1,307,111

The records of these 87 state-aided institutions confirm the belief that private benefactions will continue to supplement in generous

measure the state-aided institutions just as these show by their results that they are entitled to individual as well as state help.

Pennsylvania expended in 1912 for—

Department expenses	$4,972,538.34
Expense of government	5,390,798.00
Commissions	407,900.00
State institutions	3,342,348.33
Penitentiaries and reformatories	544,378.69
Semi-state institutions	685,750.00
Educational	8,737,600.00
Hospitals	2,683,650.00
Homes and other charitable institutions	368,300.00
Miscellaneous	1,059,500.00
	$28,192,763.36

If the appropriations for education were made by the college and university council and those for forestry, mining, etc., by boards or commissions on which were the best experts from the universities and colleges and technical schools and museums, men of scientific attainments, the result would be economy in cost and increased efficiency.

It ought not to be difficult to fix a mill tax for higher education and to devise a plan by which it should be automatically collected and set apart and distributed by the college and university council in such a way as to do the greatest good to the greatest numbers, and at the same time invite a continuance and increase of the individual munificence so characteristic of Pennsylvania.

A bill was presented to the Legislature of Pennsylvania in March for an automatic distribution of the aid which the state accords to hospitals and charitable institutions; if passed, it would eliminate the methods characteristic of the distribution of state funds by the legislature for purely public charities.

Another bill provides for a charities bureau in the Department of the Auditor General to carry on the duties imposed on the Auditor General and the State Board of Charities.

The purpose of these bills is to make automatic distribution of state revenue to and among hospitals and charities doing the work for the people of the state, on the basis of services rendered, and a method of full returns of receipts and expenditures, with power by inspection to correct extravagance, and to compel economy in expenses of maintenance, and to prevent unnecessary duplication of

institutions, but to require of them steady improvement and constant advance in methods and results.

The growing interest and general demand for the mill tax for the support of higher education are shown in recent reports, that for Virginia by Professor Charles D. Maphis, of the University of Virginia; that for Texas by Professor Arthur Lefevre, of the University of Texas; and that for Ohio by President Alston Ellis, of Ohio University. That for Virginia is the report made by a commission to devise a systematic method to meet the demands of higher educational institutions, to prevent educational duplication and consequent financial waste, and to devise stable and systematic methods for the maintenance, management and expansion of these institutions. The report recommends for Virginia one medical school, one polytechnic school, and one university, and a permanent education commission with power to coöperate with the governing bodies of all institutions of higher education in Virginia through representatives.

Professor Maphis has collected and printed the opinions of representatives of the universities of California, Wisconsin, North Dakota, Minnesota, Kentucky, Michigan, Iowa, Illinois, and of the experts of the Carnegie Institute for the Advancement of Education, of New York, and of the Bureau of Education of Washington.

Based on these and other evidence, Virginia is advised to adopt a mill tax for higher education and with and through it to reorganize its institutions of higher education so that they may grow with the growth of the state and with its income and make return in increased work for the state and its people.

In the college and university council of Pennsylvania the state has a capital piece of machinery for the distribution of the proceeds of a state mill tax for higher education. In that council there are the representatives of the state, the governor, the attorney general, and the superintendent of public instruction, and of the universities, Pennsylvania, Pittsburgh, Lehigh and Bucknell, and of the colleges, Washington-Jefferson, State, Franklin & Marshall, and an eminent citizen representing the Catholic institutions of higher education. With such men that council could be safely entrusted with power to make a distribution of any sum raised by a mill tax, so that it can be distributed to the greatest advantage of all the institutions of higher education in Pennsylvania.

The last report of the Superintendent of Education gives a list of six universities, twenty-nine colleges, four law schools, four

dental schools, three pharmacy schools, thirteen normal schools and seven technical schools in Pennsylvania.

The state has created many examining boards for law, medicine, pharmacy, dentistry, veterinary candidates, osteopathy, accountants, and boards for the geological and topographic survey, vaccination, health, mining, etc., and all of them might well be affiliated with the college and university council, which could designate university and college experts to carry on the work.

BOOK REVIEWS.

ELEMENTARY CHEMISTRY with special Reference to the Chemistry of Medicinal Substances. By H. M. Gordin, Professor of Chemistry in the Schools of Pharmacy and Dentistry of Northwestern University. Vol. I. Inorganic Chemistry. Chicago: Medico-Dental Publishing Company. $3.00.

There are so many books treating of the principles of chemistry, that when a new one is brought upon the Editor's table, he is very apt to put off the consideration of it until it is finally buried out of sight. A book by Professor Gordin is not apt to be thus treated, as he is well known as a painstaking investigator and successful teacher. We are very glad that he has let some of his researches rest for the moment in order to write a text-book upon a subject which he could illuminate so well.

"So far as we know, this book is the only one in which every reaction underlying the tests of purity and identity of medicinal chemicals, particularly those of the United States Pharmacopœia and National Formulary, is adequately explained and illustrated by chemical equations. To mention only a few of the many pharmacopœial reactions that ought to be understood by those interested in medicinal chemicals and that are not treated in the usual text-books, we may refer to the reaction of hydrobromic acid with copper sulfate and sulfuric acid, the testing of zinc bromide for chlorides, the reaction of mercuric iodide with milk sugar, the reaction of sodium thiosulfate with ferric chloride, the testing of alum for free sulfuric acid, and the reactions involving Gutzeit's test. Dobell's solution, Clemens' solution, sodium perborate, collargol, pyrozone, silver organosole, and numerous other substances handled by the pharmacist and physician are not even mentioned in books that are supposed to be written especially for the healing professions.

"An examination of the very complete index will show that the book contains a wealth of information condensed into a comparatively small bulk, and the information is exact and reliable. By the use of type of two sizes it was possible to separate the elementary matter which is suitable for the beginner from the more advanced information desired by the man behind the dispensing counter."

In general style the arrangement of the matter reminds one of the foreign text-books of which Richter's may be considered to be a type. The treatment of the subject resembles that of Bloxham's work on "Inorganic and Organic Chemistry," and which the reviewer has always regarded among the most valuable of the books treating of the underlying principles in chemistry. Gordin's work, however, has an individuality of its own and may be recommended to all teachers and students in pharmacy, medicine and dentistry.

PHARMACY, THEORETICAL AND PRACTICAL. A Text-book Treating of the General Principles of Theoretical and Practical Pharmacy. By Oscar Oldberg, Dean Emeritus, Northwestern University School of Pharmacy. Chicago: George D. Oglesby.

This is the last book written by Professor Oldberg, whose demise in February of this year (see this JOURNAL, pp. 272–275) was the cause of profound sorrow not only among his former students and associates at Northwestern University but among his colleagues and friends throughout the pharmaceutical world. Professor Oldberg understood students and saw the subjects which he taught from their point of view. He had an unusually happy faculty of knowing how to begin a subject, to develop it, and to keep at it until the student saw every part clearly and was not confused when he had finished with it. It is by reason of this gift as a teacher that he will continue to live through his text-books even when his students and colleagues have gone. He was capable of digesting what he read, to sift the useful from that which was unimportant and to present his knowledge in an original manner and as a finished product. This is well illustrated in his text-book on Pharmacy, the subject of this review. We find fundamental subjects, like the following, considered in distinct chapters: The Brussels Conference; General plans of construction of Pharmacopœias; Differences in purpose of U. S. Pharmacopœia and National Formulary; Principles of Selection of Pharmacopœial Medicines, Nostrums in Pharmacopœias, etc. Under the "Mathematics of Pharmacy" we find it stated "In the absence of national laws defining the exact

meaning of the units of length, weight and volume employed in the United States, several individual states undertook to define their respective values. The State of New York passed a law declaring that within its borders a gallon shall be 'the volume of 10 pounds of water at 40° C. in vacuo'—a gallon never before heard of and one that has never been used. Until that law shall have been repealed the use of any other gallon is illegal in that State and a gallon conforming to that law is illegal in all other states and violates the interstate commerce and revenue laws in all states, New York included." With an unusual breadth of mind Professor Oldberg has brought into a single volume an unusual amount of valuable information which is not only valuable but interesting.

All of the various processes employed in practical pharmacy and the principles underlying pharmaceutical manipulations of all kinds, are treated most minutely and extensively. This work will continue to stand as a monument to him who may well rank among the greatest of teachers in pharmacy that this country has produced.

A Critical Revision of the Genus Eucalyptus. By J. H. Maiden (Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney). Vol. II. Part 7. Part XVII of the complete work. (With four plates).

In this part the following species of Eucalyptus are described, together with their synonyms, distribution, and affinities: *Eucalyptus salmonophloia; E. leptopoda; E. squamosa; E. Oldfeildii; E. orbifolia* and *E. pyriformis.* The illustrations accompanying this monograph are excellent and the work is being conducted with the same degree of thoroughness which has characterized the portion already published.

Photomicrographs of Spirochetae, Entamebae, Plasmodia, Trypanosomes, Leishmania, Negri Bodies, and Parasitic Helminths. Office of the Surgeon General, War Department, Washington, D. C., 1913.

Bulletin, No. 1 contains reproductions of a valuable collection of photomicrographs which will be of very great help in the study and diagnosis of these parasites. The text not only describes the methods used in the preparation of the specimens shown, but gives ample directions, clear enough to be followed by every officer of the Medical Corps, for the preparation of similar specimens. The greater number of the negatives are the work of the late Dr. William M. Gray, of the Army Medical Museum, while the text

is the work of Capt. Charles F. Craig, assistant curator, Army Medical Museum; Capt. Henry J. Nichols, Medical Corps, instructor, Army Medical School, and Major F. F. Russell, Medical Corps, Curator, Army Medical Museum.

PAPERS BY THE OFFICERS OF THE MEDICAL CORPS, U. S. ARMY, read before the Fifteenth International Congress on Hygiene and Demography, Washington, D. C., September, 1912.

This is Bulletin No. 2 and is published for the instruction of medical officers of the army. It includes some eighteen very valuable papers which were read at the Intrnational Congress on Hygiene and Demography, a report of which was given in this JOURNAL, November, 1912, by Mr. Wilbert.

ANNALES DU MUSEE COLONIAL DE MARSEILLE, fondees en 1893 per M. le professor Dr. Edouard Heckel, et publies sous sa direction. Marseille Musee Colonial 5, Rue Noailles, 5, 1912.

Volume 10 (1912) of this valuable publication contains a number of papers of very great interest, among which the following may be mentioned "The Sapotaceæ of the Group Syderoxylineæ," by Marcel Dubard; "Edible Plants of The French Congo," by M. Baudon; "Analyses of Some Samples of Edible Earth of The French Colonies," by Docteurs Aloy et Bourdin; "Anatomical Studies of Several Species of Kalanchoe of Madagascar," by MM. F. Jadin et A. Juillet; "New Contributions to the Flora of Bourail, being the fifteenth contribution to the flora of New Caledonia," by M. H. Guillaumin; "Anatomical and Morphological Studies of Pelea Madagascarica," by M. A. Juillet; "New Observations of the Plants of New Caledonia," by M. Edouard Hekel; "The Bananas, The Exploitation, Commerce, Culture, and A Systematic Study of the Genus Musa," by M. E. de Wildeman.

It is a matter of great regret to the editor that he cannot give an abstract even of these valuable papers as they are all rich in information and important contributions to the several subjects mentioned.

ANNALES DU MUSEE COLONIAL DE MARSEILLE, fondees en 1893 par M. le professor Dr. Edouard Heckel, et publies sous sa direction. Marseille Musee Colonial 5, Rue Noailles, 5, 1911.

Volume 9 contains seven monographs of equal interest and value as those already mentioned as eminating from the Colonial Museum of Marseilles. They are as follows: "Contribution to the Study of the Structure of the Fruit and Seed of the Clusiaceæ," by M. H.

Jacob de Cordemoy; "Morphological and Anatomical Researches on the Seeds of Ravenala," by M. E. Decrock; "Upon a new Pittosporum of New Caledonia," by M. Marcel Dubard; "Contribution to The Flora of Bourail (New Caledonia)," by M. A. Guillaumin; "Catalogue of the Phanerograms of New Caledonia and its Dependacies," by M. A. Guillaumin; "Upon Sarcocaulon Patersonii Eckl et Zeyh., from the view point of the anatomy and the natural resin of the bark," by M. Louis Planchon; "Upon *Erythrophleum densiflorum* (Elm.) Merr.," by M. Louis Planchon.

NOTES SUR LA MEDECINE ET LA BOTANIQUE DES ANCIEN MEXICAINS, par A. Gerste S. J. Deuxime Edition, Rome, Imprimerie Polyglotte Vaticane, 1910.

A work of very great historical and literary interest dealing with the pre-Columbian medicines, magical medicines including amulettes, the ancient poetical literature, the influence of civilization upon the medicine of Mexico, etc.

PROVINCIAL HOSPITAL PHARMACOPŒIAS, comprising the Formulas for Medicinal Preparations Used in Twenty-five Hospitals and Infirmaries in Great Britain. Published at the offices of "The Chemist and Druggist," 42 Cannon Street, London, E. C. Australia, Adelaide, Melbourne and Sydeny. 1913.

This book is published in conformity to "The Chemist's Dictionary of Synonyms" and the "Chemist's Dictionary of Medical Terms" published by the "Chemist and Druggist" and with which many of our readers are doubtless familiar. The present volume contains formulas for medicinal preparations used in twenty-five hospitals and infirmaries in Great Britain outside of London. The formulas are in a condensed form and will prove to be of very great service to pharmacists and physicians in the United States since it includes excellent examples of up-to-date pharmacy and prescribing.

"THE SPATULA INK FORMULARY, Recipes and Directions for Making all Kinds of Inks for all Purposes," by Dr. J. H. Oyster. The Spatula Publishing Co., Boston, Mass.

The compiler of this book has been collecting formulas for the past thirty-five years and presents a very complete list of ink formulas for every practical purpose. In fact practically all known recipes for inks will be found in this volume. The opening chapter is devoted to "the Art of Making Ink." This is followed by for-

mulas and directions for making inks and writing fluids of all kinds and colors. Much other cognate information is also given. Some of the subjects treated are: How to make ink permanent, to freshen old writing, preservation of inks, to restore faded writing, ink powders and tablets, invisible and sympathetic inks, ink erasers, blotting paper, inks for rubber stamps and hectographs, typewriter ribbons, inks to write on celluloid, glass, porcelain, show cards, photographs, sacks, wood, steel, tin, zinc, etc., respectively; sheep marking ink, shoemaker's ink, printing inks, pencils to write on glass and metals, etc., etc.

E. MERCK'S ANNUAL REPORT OF RECENT ADVANCES IN PHARMACEUTICAL CHEMISTRY AND THERAPEUTICS. Vol. XXV, E. Merck Chemical Works, Darmstadt, 1912.

Those of us who have used these "Annual Reports of Merck" have come to rely upon them for the well digested information and succinct summaries they contain of recent discoveries in the field of pharmaco-therapy. The Reports deal not only with substances eminating only from the Merck Chemical house, but all the newer preparations and drugs that have a scientific basis for their introduction into medicine. The editor's view of the value of this work is best shown probably by the fact that we republished in its entirety in the January issue of this JOURNAL the article on the "Digitalis Glucocides and Allied Drugs" taken from this volume. This is the clearest and best presentation of this subject that we have ever seen and well illustrates the broad spirit that dominates E. Merck & Co. in issuing this publication.

REPORT OF LEHN AND FINK'S ANALYTICAL DEPARTMENT FOR 1910–1912. Issued by Lehn and Fink, New York, January, 1913.

This report contains a great deal of analytical data on the examination of nearly a hundred different substances. We are very fortunate in having this information in a form that is available for reference and we hope that it may be possible for us to publish from time to time some of the results incorporated in this volume. This has already been done in the case of "Haarlem oil" in our June issue.

SEMI-ANNUAL REPORT ON ESSENTIAL OILS, SYNTHETIC PERFUMES, ETC. Published by Schimmel & Co. (Fritzsche Brothers), Miltitz, near Leipzig, London, New York, April, 1913.

Essential oils whether viewed from the scientific or commercial point of view are among the most interesting of plant constituents.

We cannot expect to keep up with the scientific developments let alone the manifold applications to which they are constantly being applied by merely attempting to read the more or less isolated publications in the literature. Then, too, it is exceedingly difficult for the average student to distinguish the information published and which is genuine from that which is false. During these many years we have come to rely upon the Semi-Annual Reports of Schimmel & Co., and we look forward each spring and fall to these publications.

The present volume contains as a frontispiece an excellent portrait of Mr. Carl Brucker, who was the senior resident partner of the firm of Fritzsche Brothers of New York. Mr. Brucker played a large part in the development of this firm's business in the United States. He was a man of sterling character, untiring industry and his genial disposition endeared him to all who had any relations with him.

COLLECTED PAPERS FROM THE RESEARCH LABORATORY OF PARKE, DAVIS AND CO., Detroit, Mich. Reprints, Vol. 1, 1913.

In this volume we have a collection of some thirty articles representing the research work which has emanated from the Reasearch Laboratory of Parke, Davis and Company. The articles are by different members of the staff and have been published in the different medical, pharmaceutical and health publications of Europe and the United States. They cover a wide range of subjects extending from the histological study of drugs to bio-chemical studies of all kinds. In this form the papers are conveniently arranged for reference and it is to be hoped that the present plan will be continued in the future.

PROCEEDINGS OF FIRST ANNUAL MEETING OF NATIONAL ASSOCIATION OF MANUFACTURERS OF MEDICINAL PRODUCTS. Held at the Waldorf-Astoria Hotel, February 6 and 7, 1912–1913.

The National Association of Manufacturers of Medicinal Products was formed to maintain high standards in the manufacturing and marketing of medicinal products; to insure to individual members the just and proper reward of initiative, discovery and invention; to prevent fraudulent practices in the drug trade; to encourage the lawful enforcement of sound drug legislation, and effect the official observance of the fundamental law of the land; to prevent the subversion of the law to factional purposes; to amicably adjust differences; to advance uniform and just drug legislation; and in

other lawful ways to promote the welfare of and fraternity among those engaged in the manufacture of therapeutic agents for the use of the medical and allied professions.

This association has it within its power to wield a beneficient influence in all that pertains to the control, supply and sale of medicinal products. We doubt not but that the association has in mind the opportunities and responsibilities of such an organization of representative manufacturers. It would seem that if this Association had done nothing more since its organization than to invite Dr. Carl L. Alsberg, Chief of the Bureau of Chemistry, U. S. Department of Agriculture, to address the members and for Dr. Alsberg to accept the invitation that the organization would have been well worth while. It was an unusual opportunity for Dr. Alsberg and his address which is printed in the Proceedings has done much to assure manufacturers and others that he has a through comprehension of the situation and that he will meet the questions as they arise with just and decisive action.

The present officers of the Association are: President, Frank G. Ryan, of Parke, Davis & Co., Detroit; Vice-President, Adolph G. Rosengarten, of Powers-Weightman-Rosengarten Co., Philadelphia; Treasurer, Henry C. Lovis, of Seabury & Johnson, New York; Secretary, Charles M. Woodruff, of Detroit.

STARVING AMERICA. By Alfred W. McCann, Member of Vigilance Committee, the Associated Advertising Clubs of America. F. M. Barton, Publisher, Cleveland and New York. 12mo., 270 pp., $2.00.

The signs of a popular awakening upon the subject of the food we eat are to be found in the increasing number of magazine articles and books about it written by authors who possess the ability to present scientific matters in a form intelligible to everybody.

In the book called "Starving America," Mr. McCann, who wields a "pen with a punch," places the subject of the mineral matter in the food we eat in a position of great importance, where it properly belongs.

Mr. McCann has long been connected with the food industries along the lines of manufacturing, advertising and selling, and he combines with this practical knowledge a comprehension of scientific facts which makes his writings instructive as well as entertaining to the reader. Some of the chapter headings selected at random will give a better insight into the character of the book than any long drawn out review which might take the place of reading the

book for some people: "Fifteen Million Defective Children; What the Minerals Do; Ferments; Minerals Lost or Changed; White Bread Starvation; Polished Rice; Other Nations Alarmed; Candy, Ice Creams and Other Foods; Food Adulterations; Food Preservatives; Labels that Mislead; The Poison Squad; Keeping Foods; What to Feed the Child; Food Experiments in Schools; An Ideal Restaurant; For Physicians Only."

Mr. McCann's information regarding many phases of the subject is obtained from the official reports on food inspection in a number of States. The book is entertainingly and convincingly written and should be read by manufacturer, advertiser, chemist and consumer alike.

CHARLES H. LAWALL.

HEALTH AND LONGEVITY THROUGH RATIONAL DIET. By Dr. Arnold Lorand, Physician to the Baths, Carlsbad, Austria. Royal Octavo, 416 pp., $2.50. F. A. Davis Co., Philadelphia.

Many books have been written upon the subject of dietetics by cranks and faddists but few are known which combine such a thorough grasp of the subject with such an interesting manner of treating it as is seen in this work, the introduction to which has been written by Dr. Victor C. Vaughan, who personally endorses the book in its important points and especially as regards its freedom from fads. In the preface Dr. Lorand says: "Probably but very few physicians have so frequently an opportunity to observe the harmful consequences of a faulty mode of nourishment as one who is practicing as a Carlsbad Bath Physician. It is a surprising fact that even scholars well versed in a variety of subjects often display the veriest ignorance or show the greatest carelessness precisely in respect to what and the manner in which they eat. Others again fall into the opposite error—those, for example, who studiously avoid all foods containing even a trace of uric acid forming constituents, lest an excess of such substances prove injurious, and meanwhile overlook the fact that in addition to such uric acid producing components these foods contain many other important substances, *e.g.*, certain nutritive salts, an insufficient intake of which may result in serious injury, particularly in the period of growth and development of the body."

The subject is comprehensively considered in a logically arranged manner, beginning with the fundamental facts such as the influence of food upon man, the fundamental laws of feeding, in-

jurious modes of feeding, good and evil effects of various food substances, vegetarianism, etc. Abundant information is included regarding specific details relating to the composition of foods. Tables showing the comparative value of various foods expressed in terms of some definite constituent as lime, phosphorus, iron, etc., are inserted in their proper places in the text and as a very comprehensive index is found at the close of the book it makes a very valuable work of reference to the busy chemist or physician who frequently has immediate use for such information, which is sometimes difficult to locate. These tables are all credited to the proper authorities and the original references to literature are usually given as well.

Some of the statements evidently are based upon conditions observed in Europe, for on page 191 the author says of oleomargarine "lately the animal fat has largely been replaced by vegetable fats which would not of itself be so bad were it not that they are often of an inferior quality. Instead of using the finer grade of edible oils the very poorest are used, and the melted animal fat which forms the principal constituent of oleomargarine is mostly replaced by tallow." This condition certainly does not exist in America at the present time.

The keynote of the book is found in the following epitomized summary in the concluding chapter. "Under-nutrition prevents young people from attaining a ripe old age and over-nutrition carries those of advanced age prematurely to their grave. Consequently the requirements are: More nourishing food for the young growing organism and moderation in the succeeding periods of life."

The book is interesting to read and valuable to possess as a library volume. CHARLES H. LAWALL.

FOOD AND FLAVOR. By Henry T. Finck; 12mo., 594 pp. The Century Co., New York, $2.00.

Of all recent books treating of the subject dearest to the heart of man, foods, the book with the foregoing alliterative title has attracted and deserves the most attention. The author combines the experience of an epicure with the observations of a cosmopolite and gives us the product in a form that makes the mouth water and stimulates the jaded appetite. It is dedicated to "Luther Burbank and Harvey W. Wiley, the two men who have done most to make our daily food palatable and honest."

The book pays tribute to Fred W. Harvey, the famous res-

taurateur of the West, and Horace Fletcher, who is so consistent in his views that his last lecture in Philadelphia was delivered in Chew Street, Germantown. It also abounds in references to famous culinary artists and epicures of all time, from Brillat-Savarin down to Soyer of paper bag cookery reputation. It will doubtless surprise many to learn that Dumas was the author of a "Dictionary of Cuisine," a "monumental contribution to the art of cooking and eating."

To describe and classify gastronomic pleasures as is done with artistic effect in music, sculpture and painting, is surely a new venture and one in which the author is convincingly able. A new nomenclature will doubtless arise to do justice to the subject, as already we encounter such appealing phrases as "overtones of flavor" and "culinary discords."

The descriptions of foreign markets are alone worth reading the book to enjoy, especially the chapter entitled "French Supremacy."

It is a pity that the author has not informed himself more accurately upon some of the minor points where he seems to have been influenced by sensational newspaper writers or by pseudo-scientific articles appearing in the magazines. For instance, in speaking of vinegar adulterated with distilled acetic acid he says, "This so-called vinegar is in most cases injurious to the health of those who consume it," and under the paw-paw (the fruit of *Asimina triloba*) he says, "Papain is much used as a substitute for soda mints," evidently ignorant of the fact that the paw-paw fruit which yields papain is from a tropical tree of the species *Carica papaya*, entirely different and distinct from the United States paw-paw, which contains no digestive ferment.

A few "bad spells" mar the work, among which are "interstate" for "intrastate" on page 34, "sarsprilla" for "sarsaparilla" on page 62, "analine" for "aniline" on page 100 and "wool alcohol" for "wood alcohol" on page 228. These are unusual in a work of this character, especially one published by a firm of such high standing as the Century Co. and are to be deprecated because such a book reaches many who cannot correct errors of this kind as they read and are likely to be misinformed in these particulars on this account.

The book can be read with pleasure and profit alike and should have a marked influence upon the cuisine of the future, inasmuch as it inaugurates a new era and gives a new viewpoint upon the subject.

CHARLES H. LAWALL.